Head Supported Mass Study

Summary of Preliminary Findings

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Humansystems Inc.

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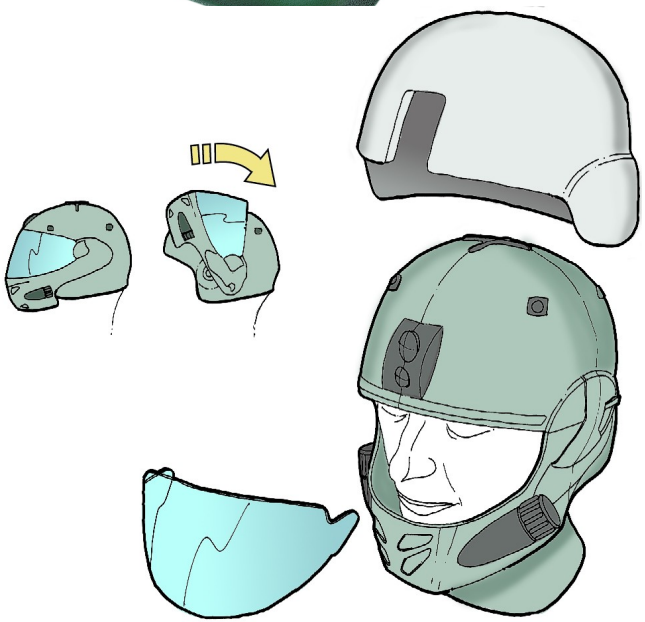
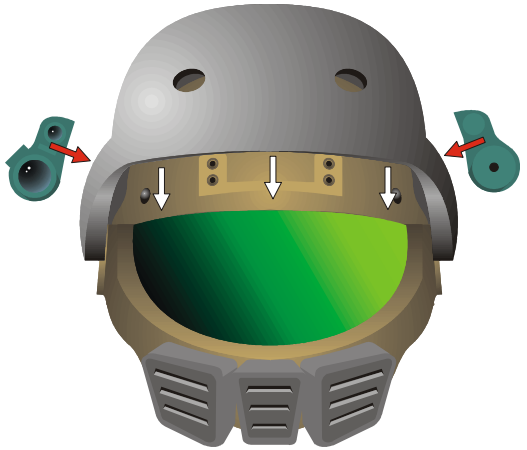
Future Integrated Helmets





Background

What are we testing?

Why test for it?

Gaps in knowledge for:

- Infantry applications
- Dynamic Tasks
- Prolonged Exposure
- Soldier Acceptance

Test Rig

Testing

Static Tests

- Standing and kneeling

Obstacle Course Tests

- Select movements and postures

Platoon Mission Tests

- Wooded and MOUT missions

Obstacle Course

Platoon Missions

Measures

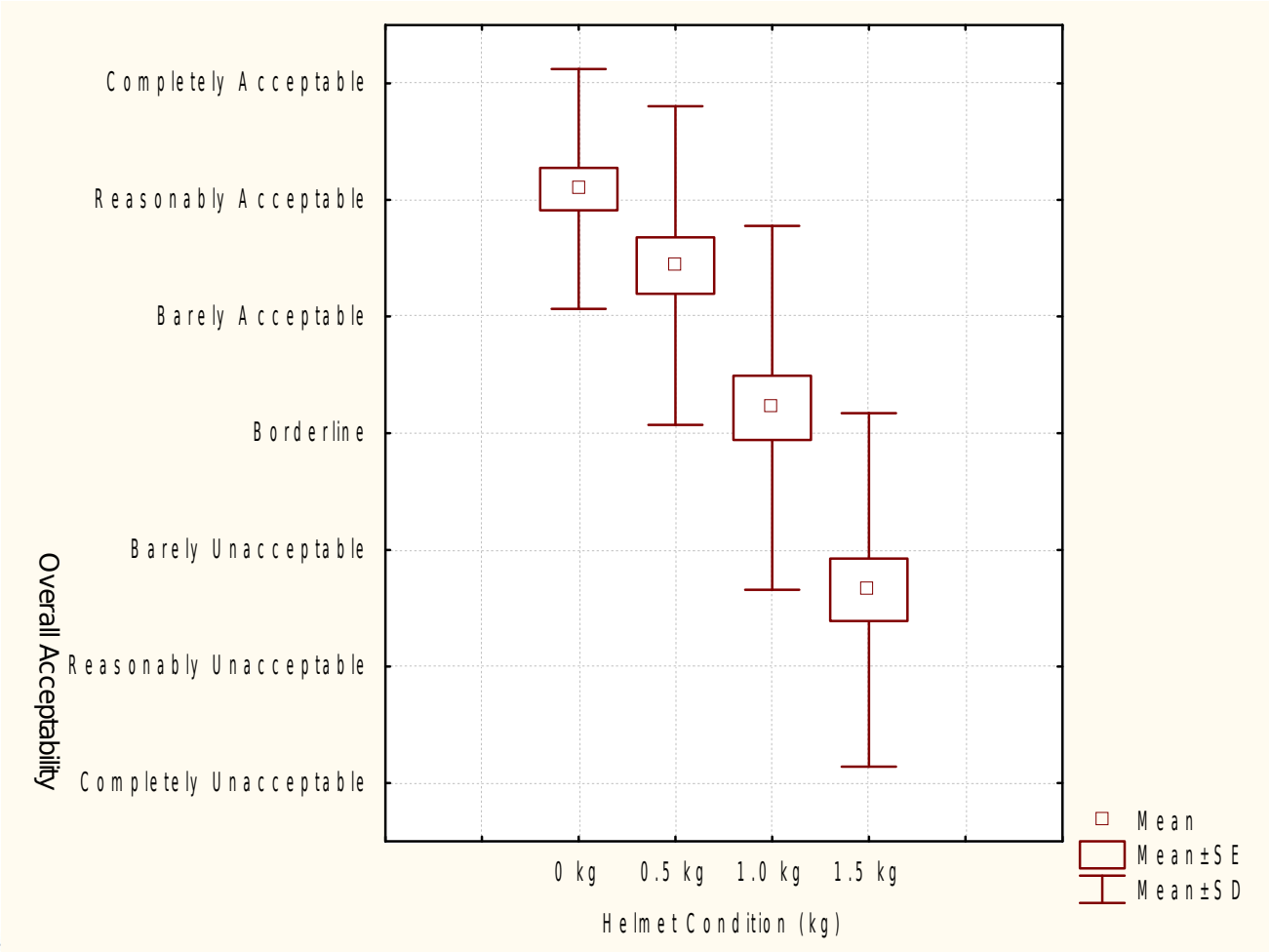
Objective Measures

- Weight position measurements
- Acceleration
- EMG

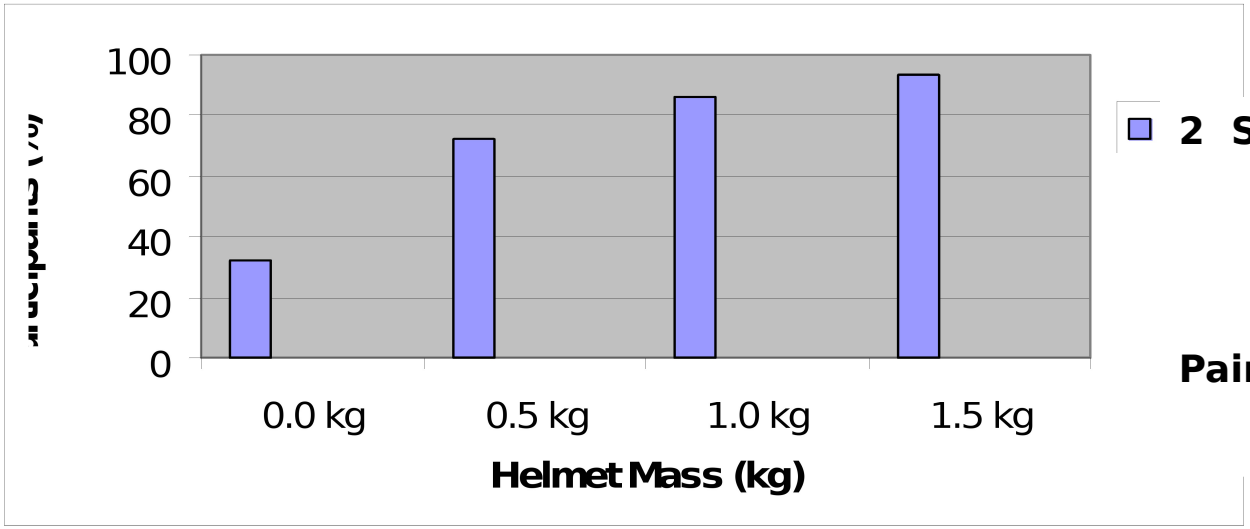
Subjective Measures

- Acceptability ratings
- Discomfort scale

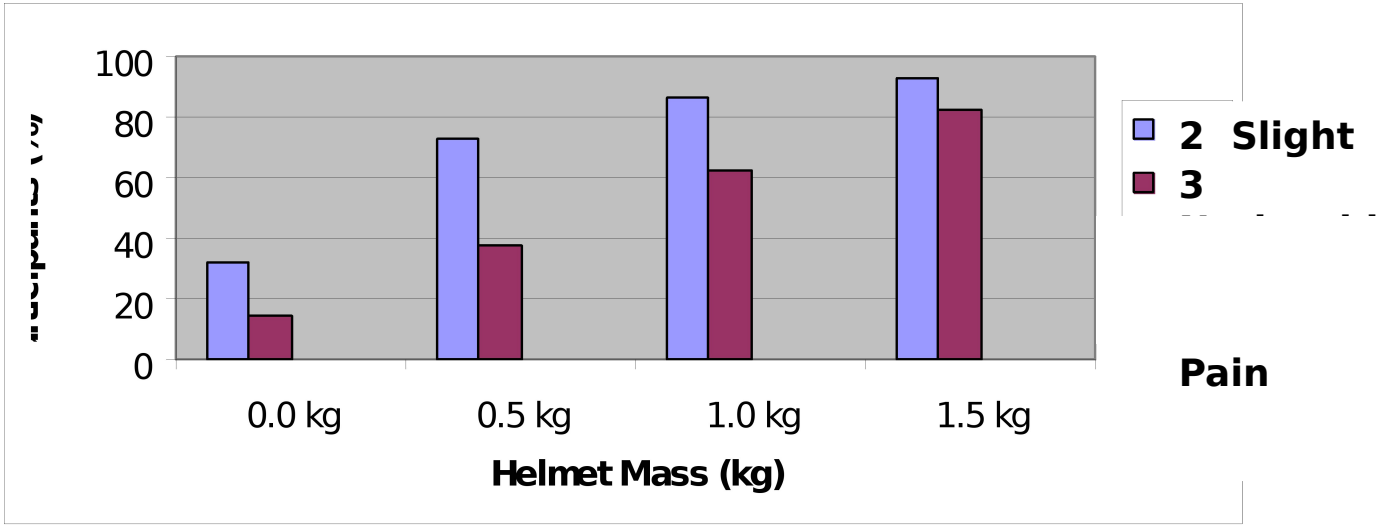
Overall Acceptance



Reports of Discomfort



Reports of Discomfort



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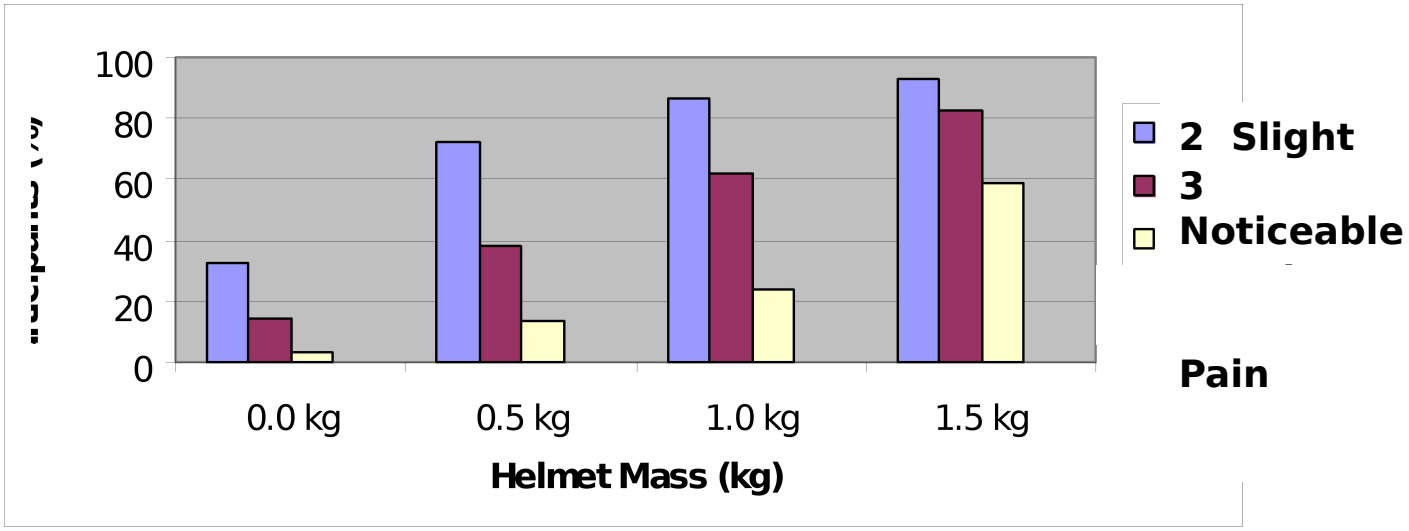
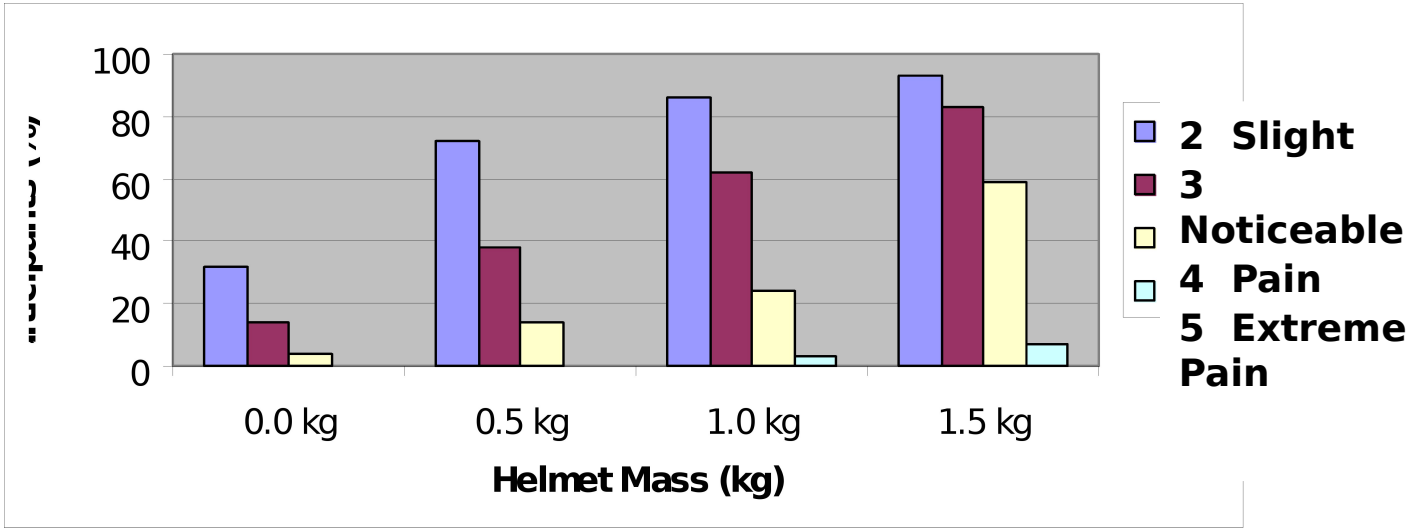
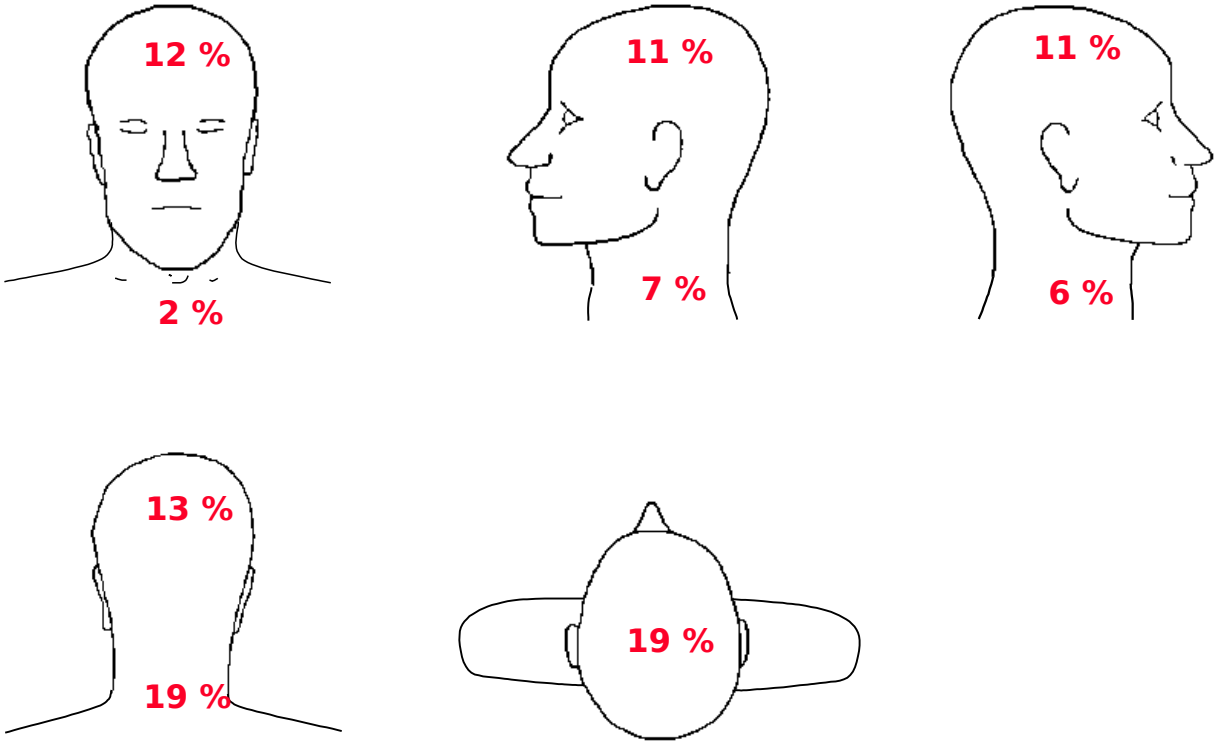
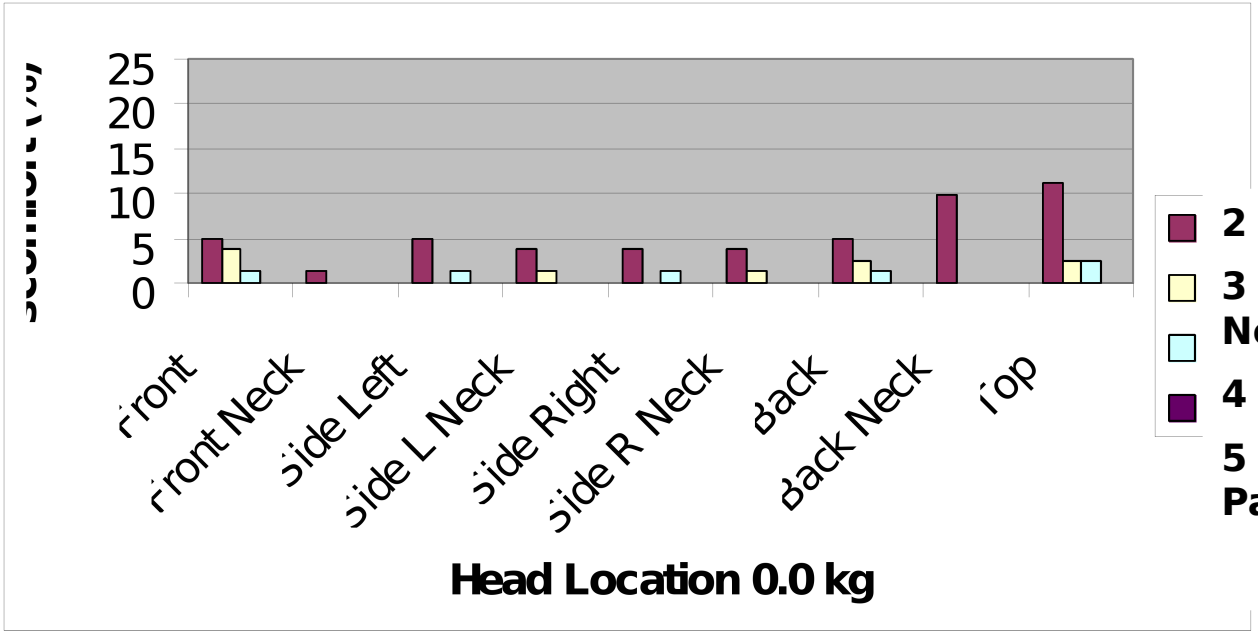


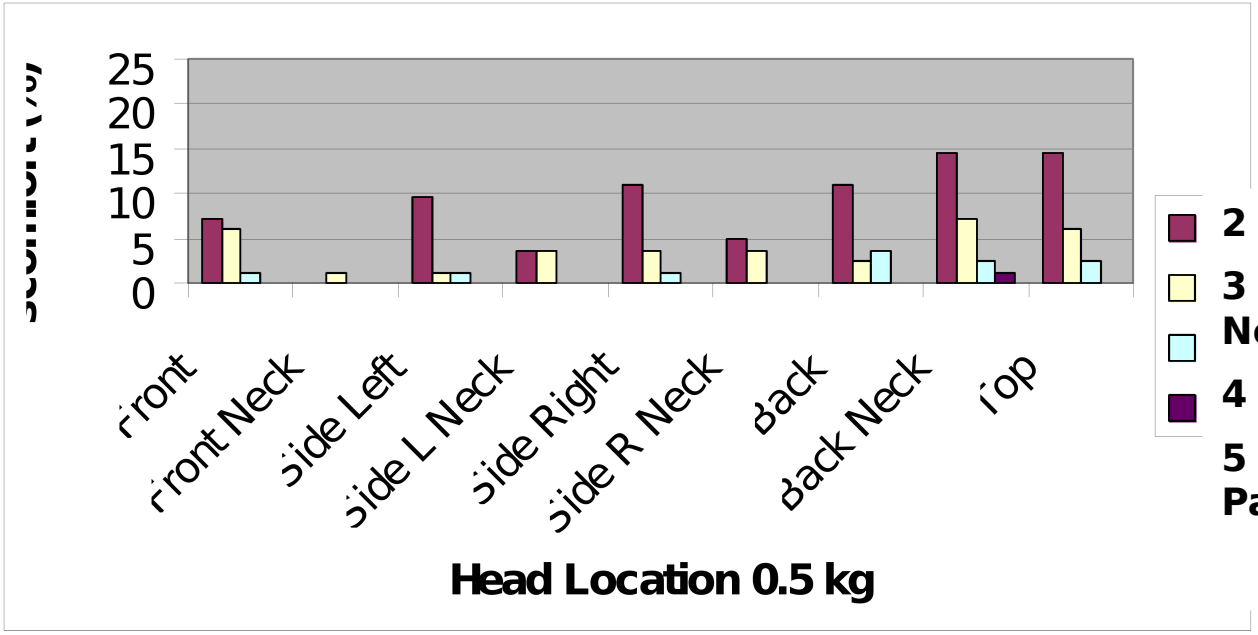
Reports of Discomfort

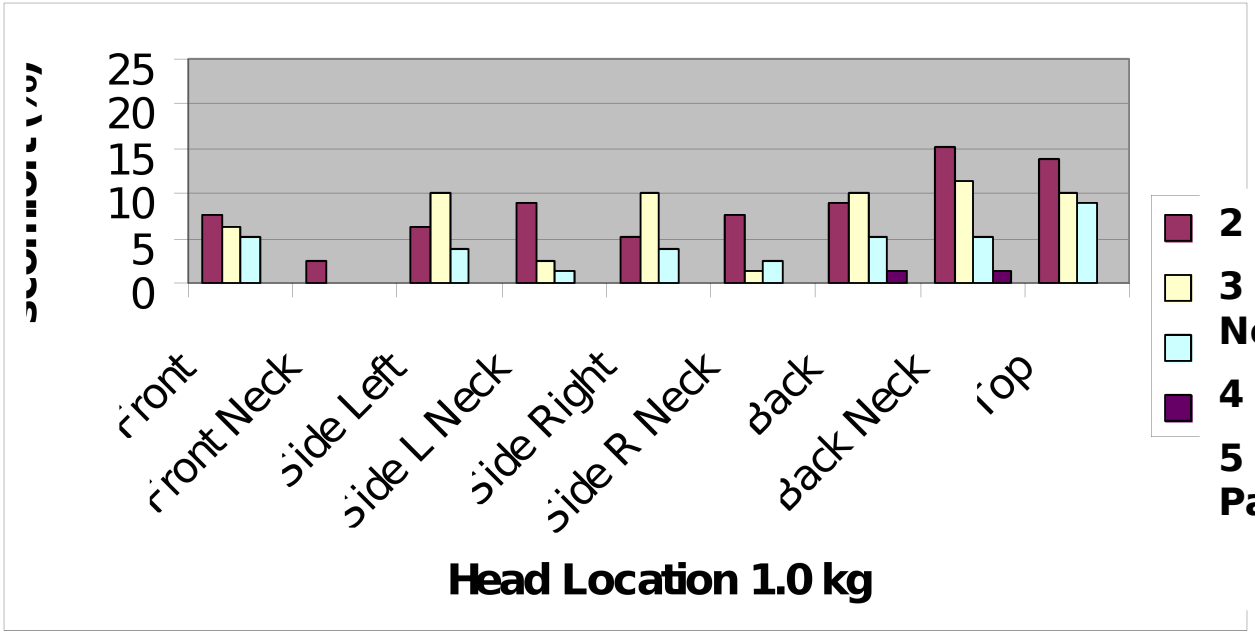


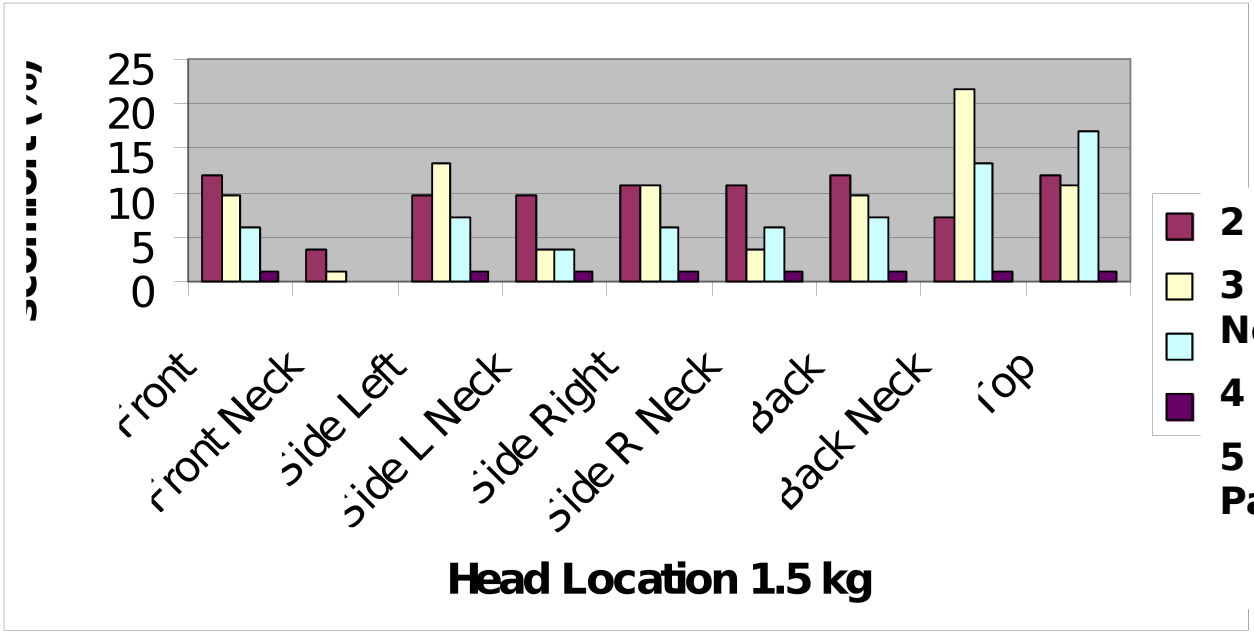
Pattern of Discomfort

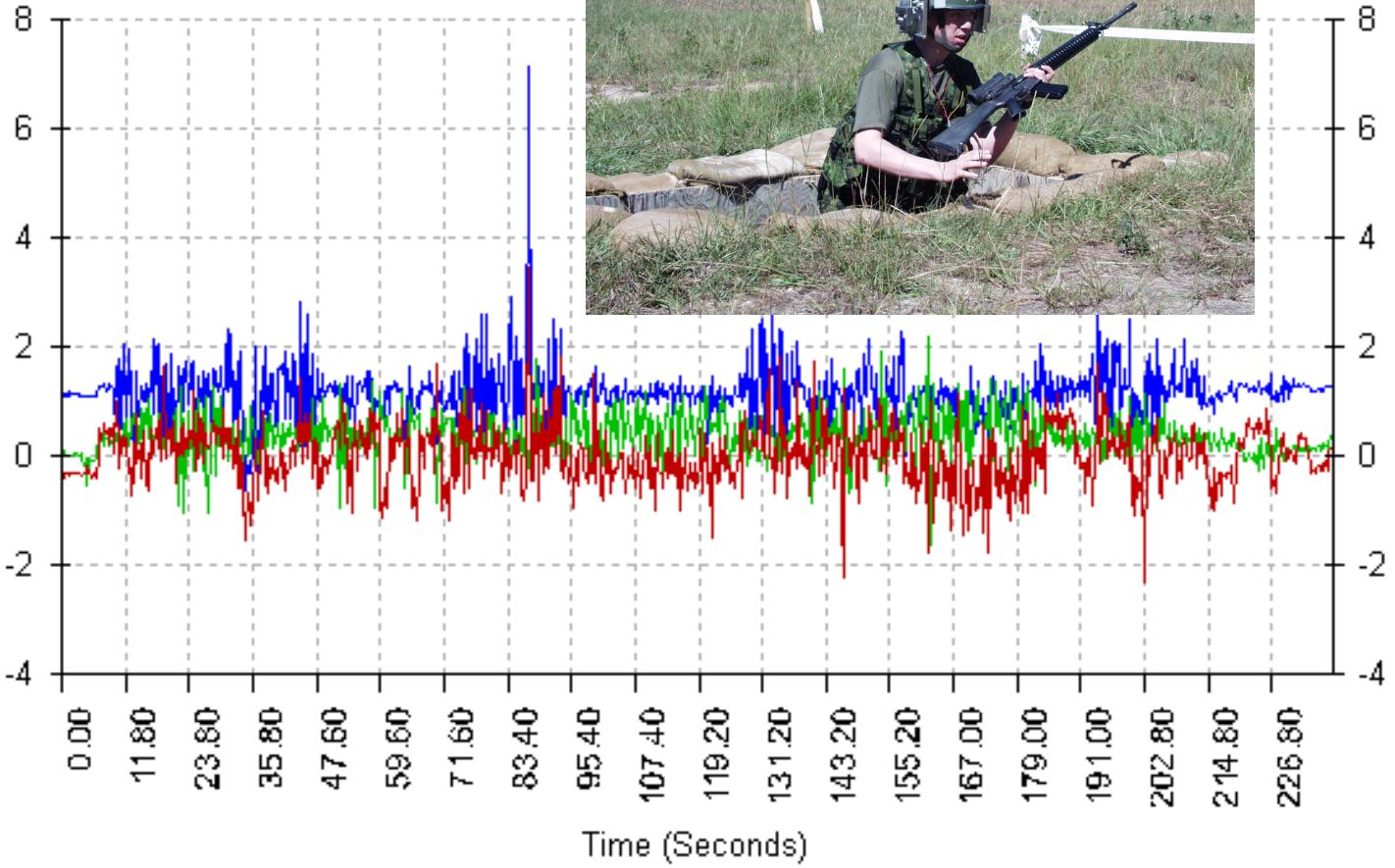



25
20
15
10
5
0
Front
Front Neck
Side Left
Side L Neck
Side Right
Side R Neck
Back
Back Neck
Top
2 Slight
3 Noticeable
4 Pain
5 Extreme Pain
Head Location 0.0 kg


25
20
15
10
5
0
Front
Front Neck
Side Left
Side L Neck
Side Right
Side R Neck
Back
Back Neck
Top
2 Slight
3 Noticeable
4 Pain
5 Extreme Pain
Head Location 0.5 kg


25
20
15
10
5
0
Front
Front Neck
Side Left
Side L Neck
Side Right
Side R Neck
Back
Back Neck
Top
2 Slight
3 Noticeable
4 Pain
5 Extreme Pain
Head Location 1.0 kg


25
20
15
10
5
0
Front
Front Neck
Side Left
Side L Neck
Side Right
Side R Neck
Back
Back Neck
Top
2 Slight
3 Noticeable
4 Pain
5 Extreme Pain
Head Location 1.5 kg



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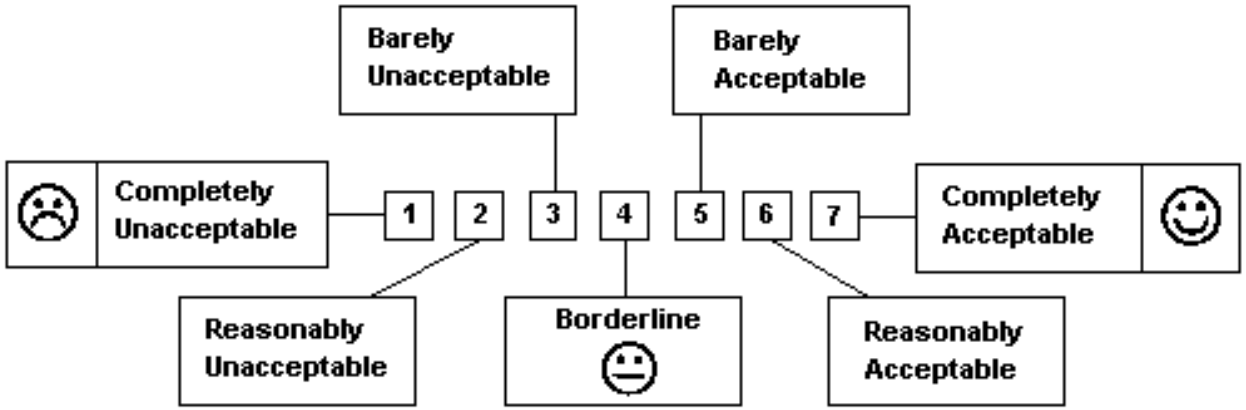
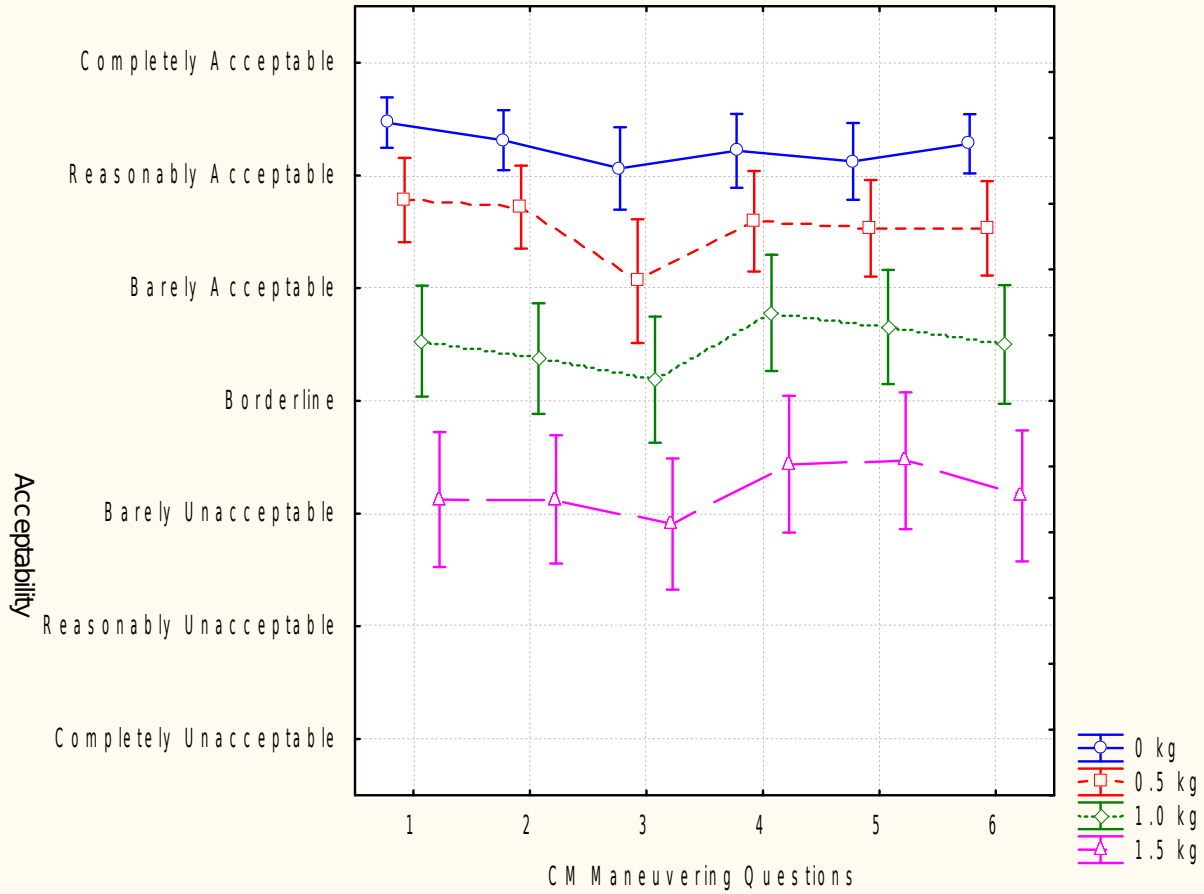
Standard Rating Scale

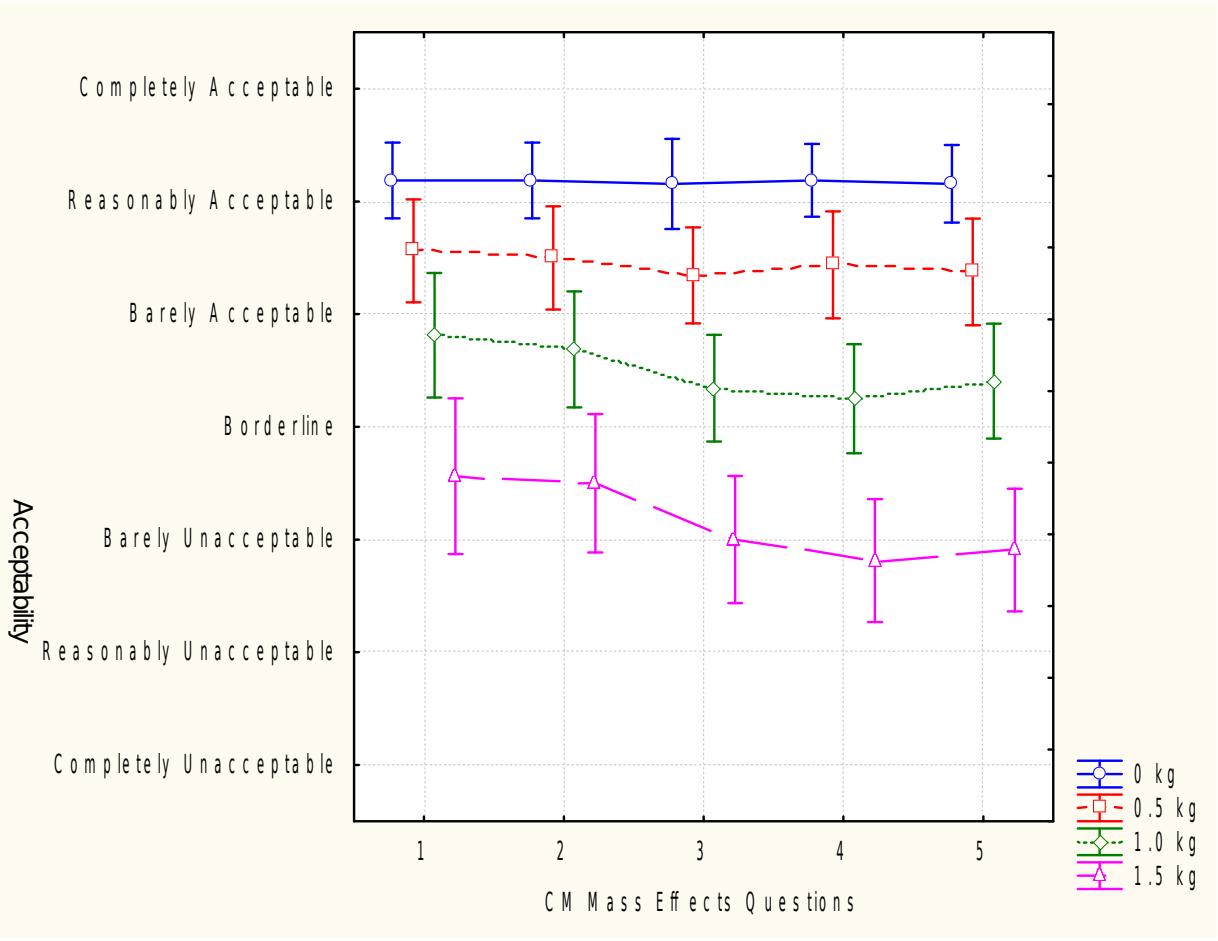


Maneuverability



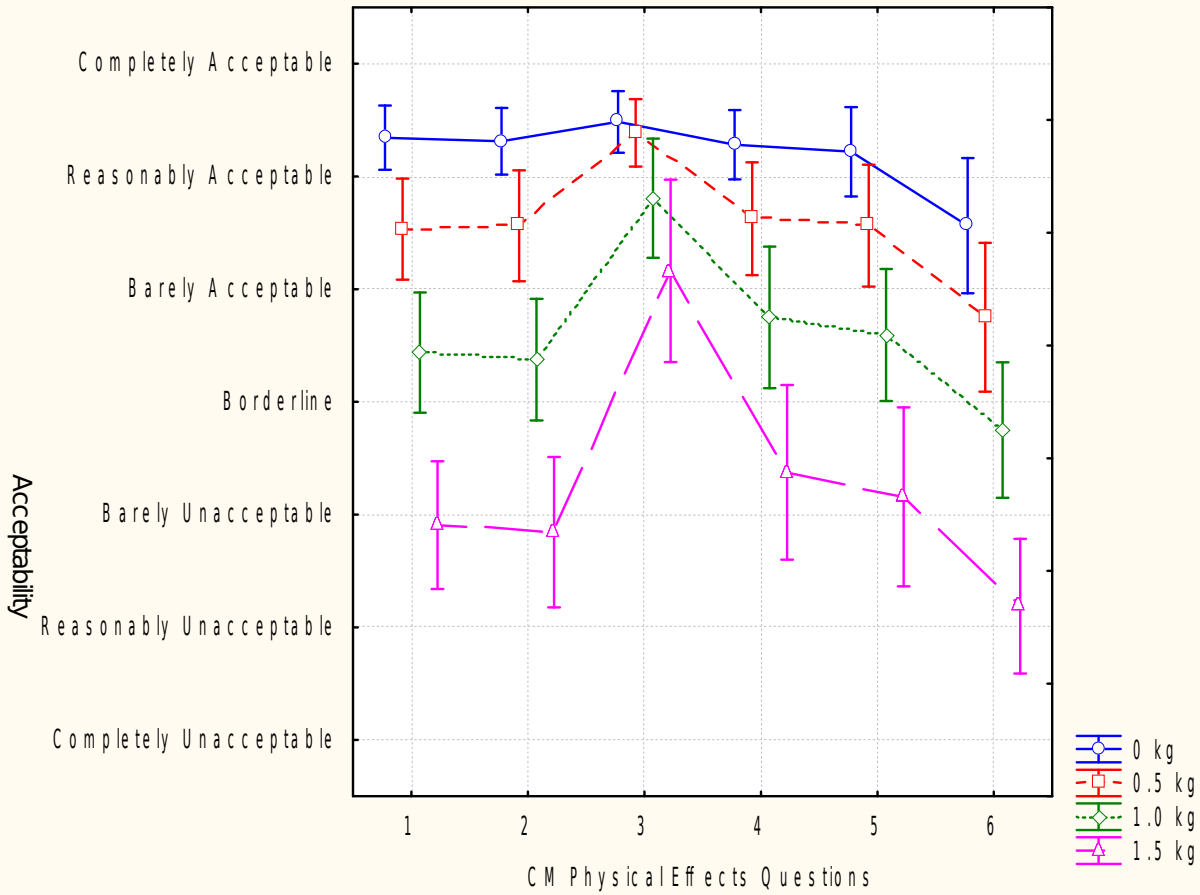
1. Ease of Maneuvering
2. Ability to Change Direction Quickly
3. Ease of Adopting Head Positions
4. Time to Adopt Head Positions
5. Range of Head Motion
6. Overall Maneuverability Rating

Mass Effects



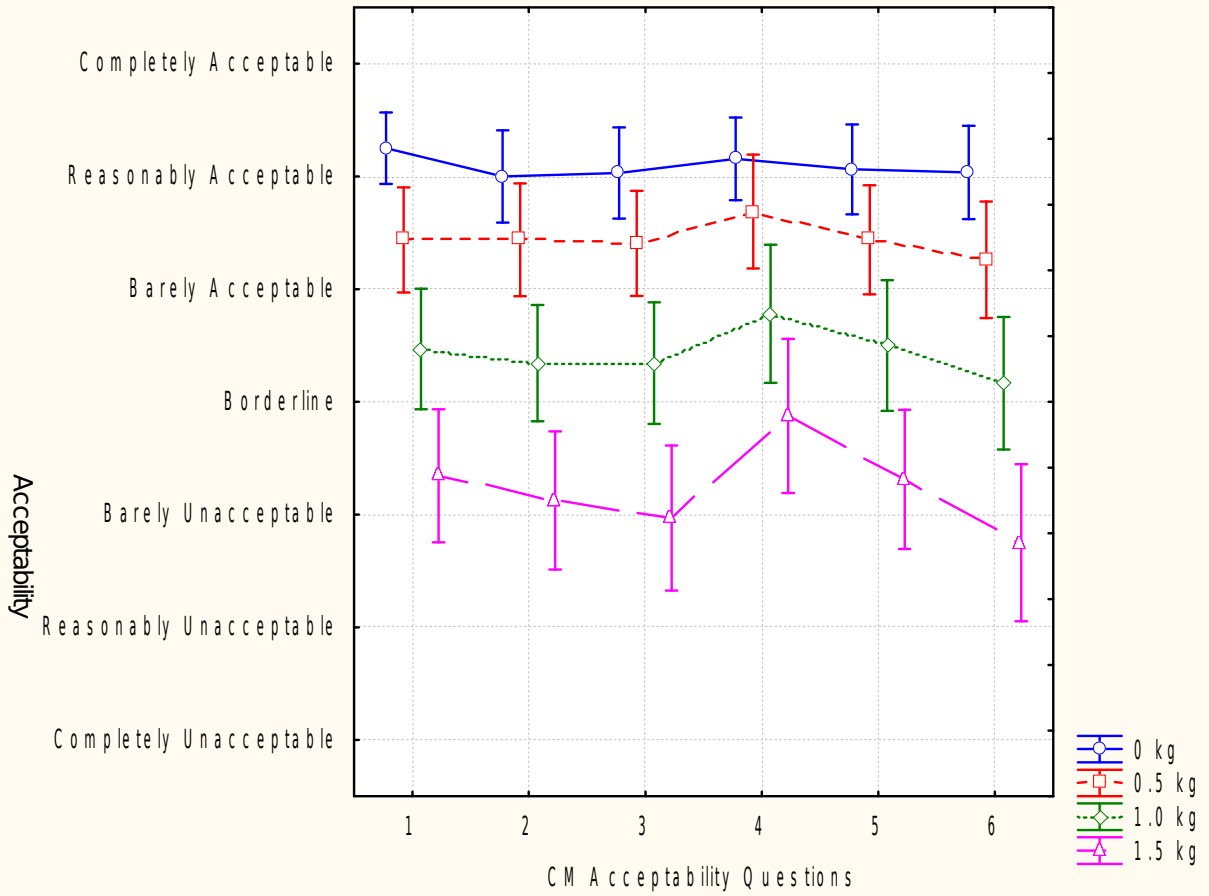
1. Balance
2. Stability
3. Momentum
4. Control of Head Position
5. Overall Mass Effects Rating

Physical Effects



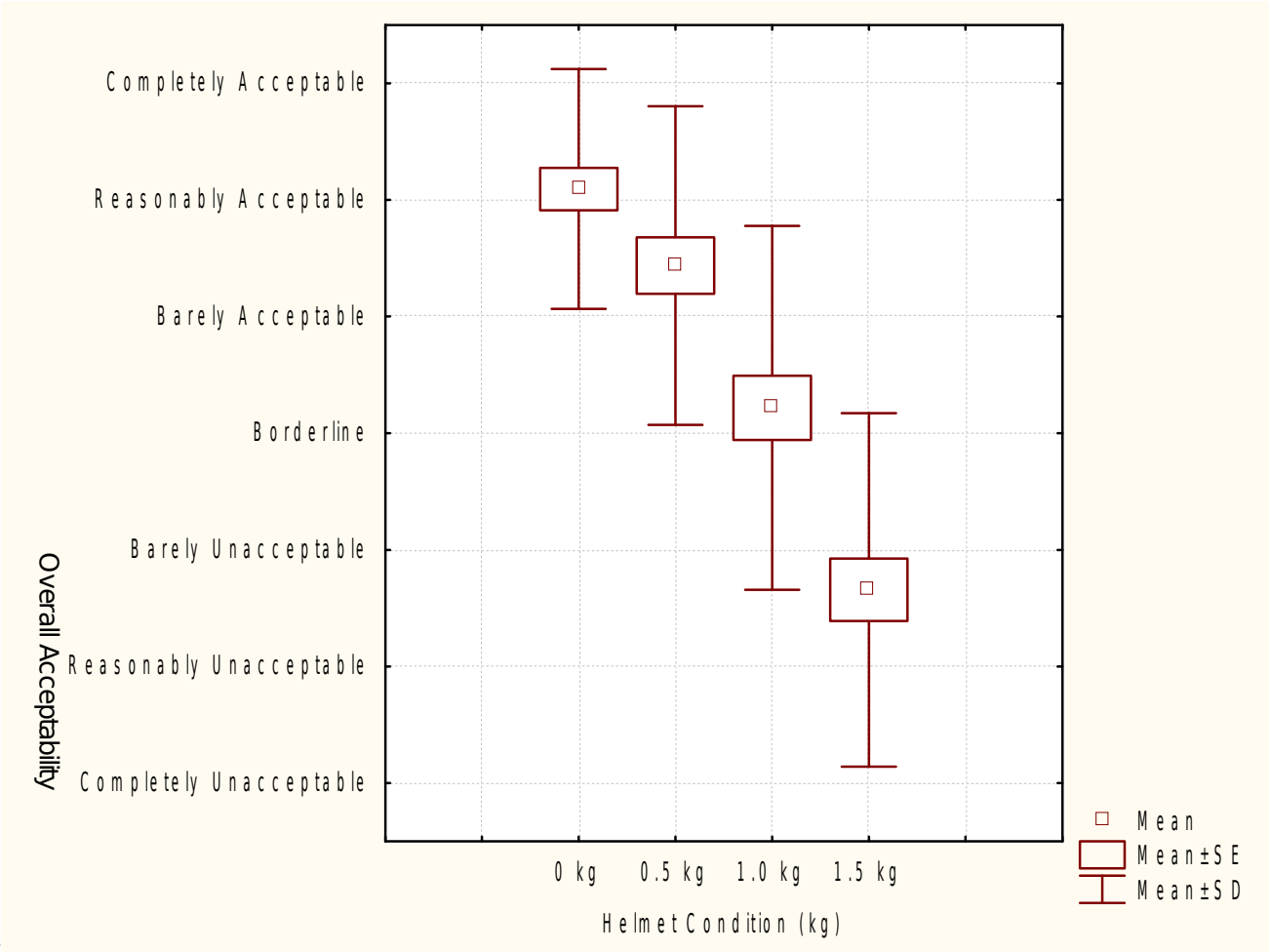
1. Weight of Helmet
2. Neck Strain
3. Nausea
4. Headaches
5. Neck Muscle Fatigue
6. Comfort

Tactical Acceptability

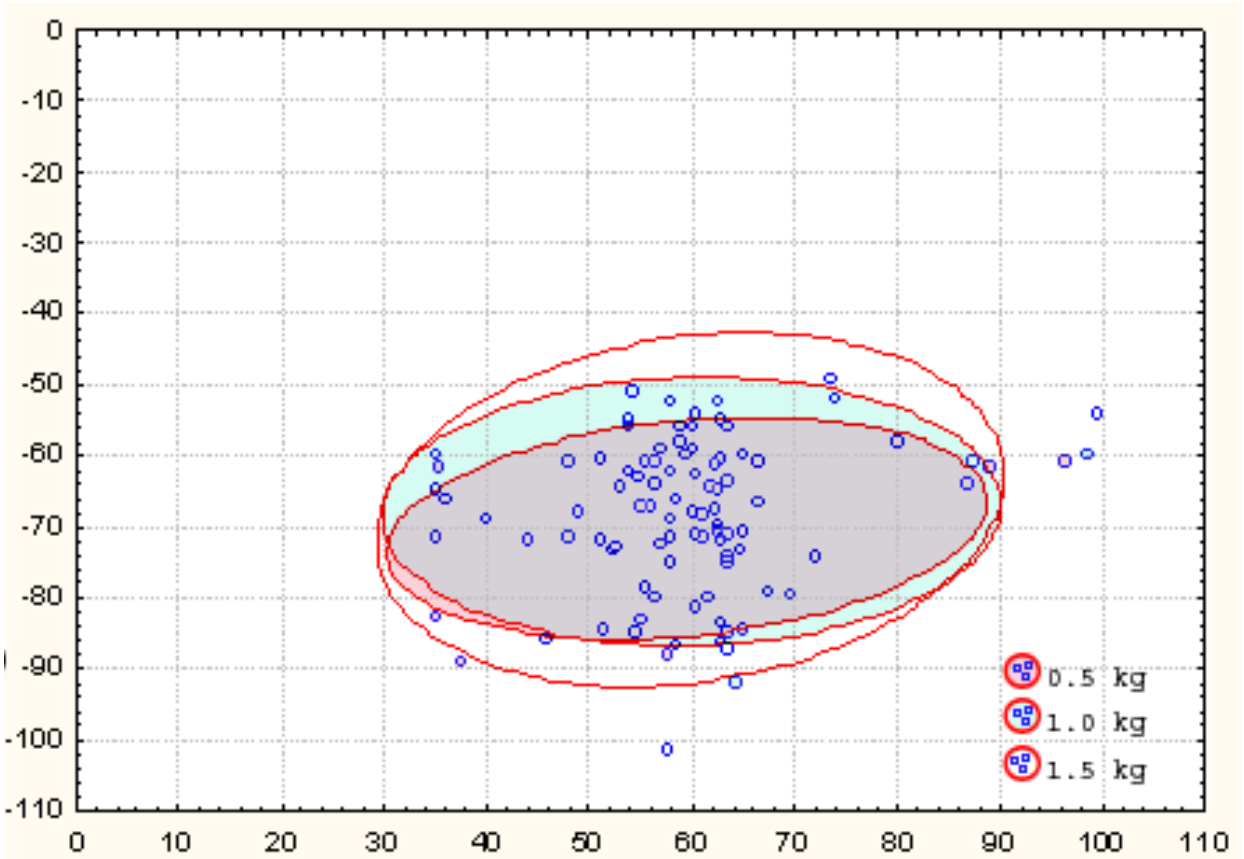


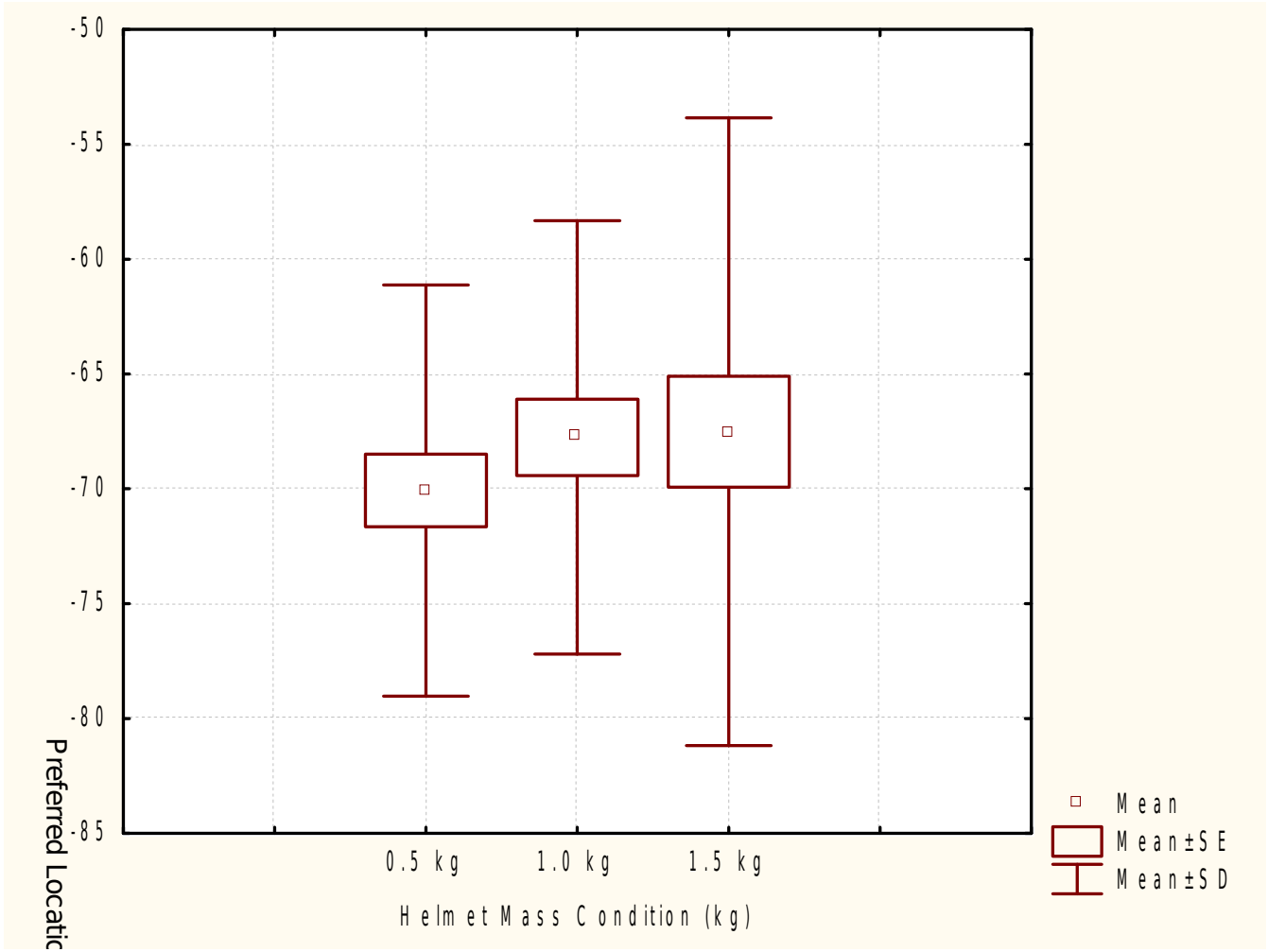
1. Survivability
2. Tactical Feasibility
3. Mobility
4. Low Activity (static/walk)
5. Medium Activity (obstacles)
6. High Activity (Platoon assaults)

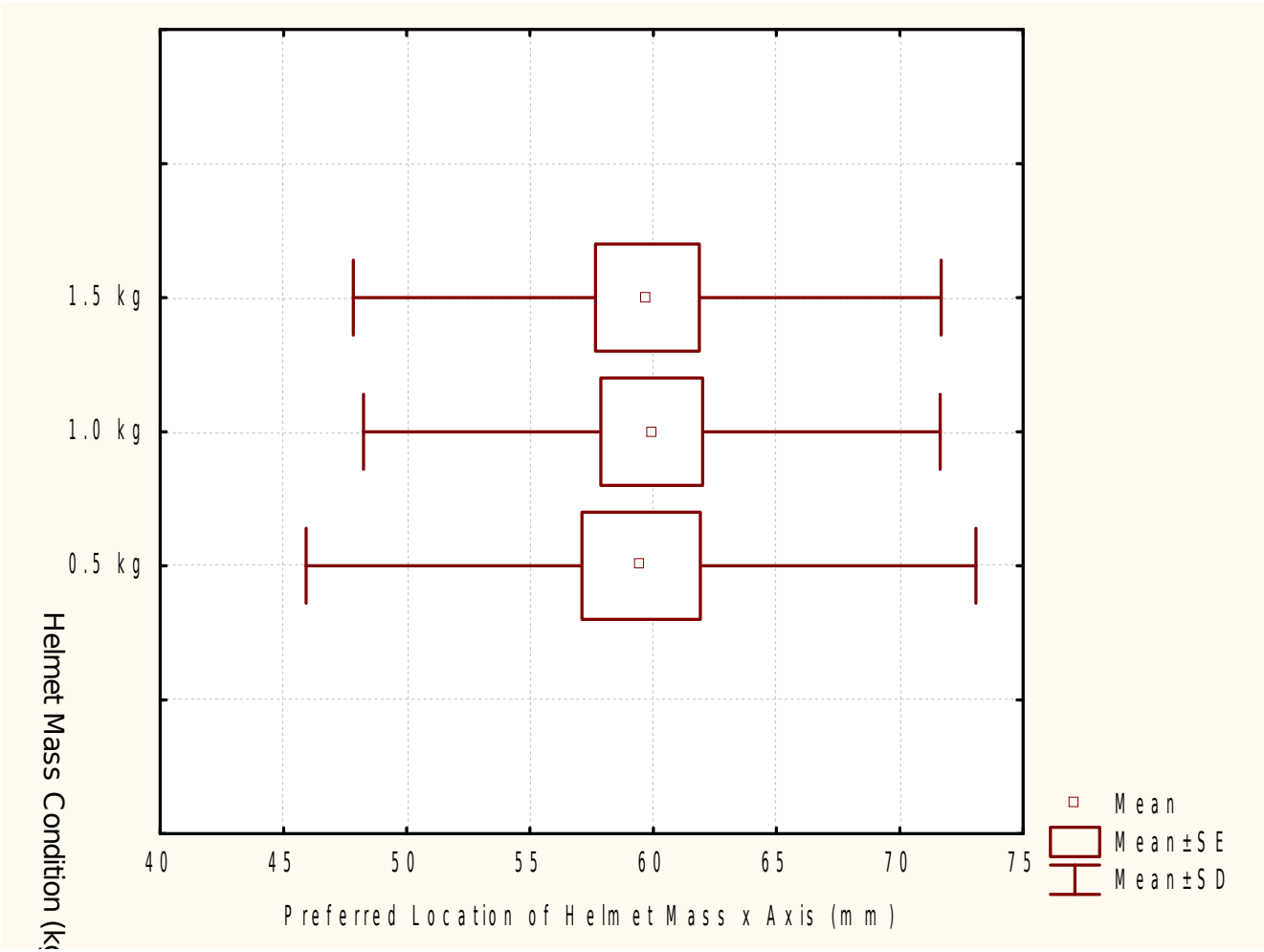
Overall Acceptance



Preferred Location of Helmet Mass Right Side




-50
-55
-60
-65
-70
-75
-80
-85
Preferred Locatic
0.5 kg
1.0 kg
1.5 kg
Helmet Mass Condition (kg)
Mean
Mean±SE
Mean±SD


1.5 kg
1.0 kg
0.5 kg
Helmet Mass Condition (kg
40
45
50
55
60
65
70
75
Preferred Location of Helmet Mass x Axis (mm)
Mean
Mean±SE
Mean±SD

Next Steps

- Characterize acceleration effects
- Mass moment of inertia testing
- Investigate asymmetrical loading
- Identify target design zones